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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/939,439	08/24/2001	Robin Levonas	060705-1830	2762

24504 7590 10/06/2003

THOMAS, KAYDEN, HORSTEMEYER & RISLEY, LLP
100 GALLERIA PARKWAY, NW
STE 1750
ATLANTA, GA 30339-5948

EXAMINER	
PHAM, TUAN	

ART UNIT	PAPER NUMBER
2643	3

DATE MAILED: 10/06/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/939,439	LEVONAS ET AL.	
	Examiner	Art Unit	
	TUAN A PHAM	2643	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *24 August 2001* .

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-26* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-26* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) *2* .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: .

DETAILED ACTION

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

2. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

3. Claims 1-10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Johnson et al. ("Johnson")(U.S. Patent No.5,909,463) in view of Amrany et al. ("Amrany")(U.S. Patent No.6,597,746).

Regarding claim 1, Johnson teaches a transceiver (see figure 2, transceiver 5, col.5, ln.16) comprising:

means for receiving a locally generated transmit signal (see figure 1, central office 10, col.2, ln.46-51), and

means for coupling the locally generated transmit signal to a communication medium (see figure 1, telephone line 15), the means for coupling further coupled to a remotely generated receive signal (see figure 1, remote terminal 30, col.3, ln.46-51).

It should be noticed that Johnson fails to clearly teach means for recovering the remotely generated receive signal configured to reduce both short-term echo components and long-tail echo components of the locally generated transmit signal wherein the reduction of transmit signal echo is realized in a hybrid echo canceller. However, Amrany teaches such features (see col.7, ln.6-12, col.2, ln.30-32) for a purpose of reducing the amount of echo generated at the transmit path.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the use of means for recovering the remotely generated receive signal configured to reduce both short-term echo components and long-tail echo components of the locally generated transmit signal wherein the reduction of transmit signal echo is realized in a hybrid echo Canceller, as taught by Amrany, into view of Johnson in order to improve an echo signal at a transmit path and a receive path in a wire-line local loop communication system.

Regarding claim 2, Amrany further teaches the transceiver wherein the means for recovering comprises a multi-stage digital filter (see col.9, ln.38-40).

Regarding claim 3, Johnson further teaches the transceiver further comprising: means for determining the length in taps of the digital filter required to reduce the short-term echo components, and means for bifurcating the multi-stage digital filter responsive to the determination means (see col.8, ln.1-23).

Regarding claim 4, Amrany further teaches the transceiver wherein the multi-stage digital filter comprises a dual-stage finite impulse response (FIR) filter (see figure 5, col.9, ln.19-20).

Regarding claim 5, Amrany further teaches the transceiver wherein the multi-stage digital filter comprises a first stage that applies coefficients derived for each tap of the first stage and a second stage that derives coefficient values for a subset of the taps of the second stage (see col.9, ln.14-21).

Regarding claim 6, Amrany further teaches the transceiver wherein the second stage applies a coefficient value to each tap (see col.17, ln.50-65).

Regarding claim 7, Amrany further teaches the transceiver wherein the second stage derives coefficient values for each k th tap (see col.8, ln.50-54).

Regarding claim 8, Johnson further teaches the transceiver wherein the second stage uses an interpolation scheme to determine coefficients to apply at each of the taps disposed between taps associated with a derived coefficient (see col.3, ln.44-62).

Regarding claim 9, Johnson further teaches the transceiver wherein the second stage applies a coefficient value at taps disposed between derived

coefficients as a function of a coefficient value for the last derived coefficient (see col.3, ln.44-62).

Regarding claim 10, Johnson further teaches the transceiver wherein the second stage applies the same coefficient value at taps disposed between derived coefficients as the coefficient value for the last derived coefficient (see col.3, ln.44-62).

4. Claims 11-26 are rejected under 35 U.S.C. 103(a) as being unpatentable over Norsworthy et al. ("Norsworthy")(U.S. Patent No.5,561,424) in view of Amrany et al. ("Amrany")(U.S. Patent No.6,597,746).

Regarding claim 11, Norsworthy teaches a method for reducing transmit signal echo (see col.1, ln.35) in a digital transceiver (see figure 1, col.4, ln.21) comprising:

bifurcating a digital filter in response to the conversion rate of the filter tap coefficients (see col.4, ln.1-10),

adaptively calculating and applying a filter tap coefficient to each tap of a first stage of the bifurcated digital filter (see col.4, ln.8-10), and

adaptively calculating a subset of the filter tap coefficients of filter taps in the second stage of the bifurcated filter (see col.4, ln.8-10).

It should be noticed that Norsworthy fails to clearly teach to apply an interpolation technique to identify the remaining set of filter tap coefficients of the second stage. However, Amrany teaches such features (see col.9, ln.14-20) for a purpose of correcting echo signal.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the use of an interpolation technique to identify the remaining set of filter tap coefficients of the second stage, as taught by Amrany, into view of Norsworthy in order to improve an echo signal at a transmit path and a receive path in a wire-line local loop communication system.

Regarding claim 12, Amrany further teaches the method wherein the step of bifurcating the digital filter is responsive to a digital subscriber line data transmission standard (col.2, ln.60-65).

Regarding claim 13, Norsworthy further teaches the method wherein the step of adaptively calculating a subset of filter tap coefficients determines a filter tap coefficient for the first tap of the second stage of the bifurcated filter and every Kth tap thereafter (see col.4, ln.9-10).

Regarding claim 14, Amrany further teaches the method wherein the step of applying an interpolation technique comprises determining a filter tap coefficient for each filter tap disposed between calculated filter tap coefficients (col.2, ln.60-67).

Regarding claim 15, Amrany further teaches the method wherein the second stage applies a coefficient value at taps disposed between adjacent adaptively calculated coefficients as a function of the coefficient value associated with an earlier encountered tap (col.9, ln.14-20).

Regarding claim 16, Amrany further teaches the method wherein the second stage applies the same coefficient value at taps disposed between

adaptively calculated coefficients as the coefficient value associated with an earlier encountered tap with a calculated coefficient (col.9, ln.14-20).

Regarding claim 17, Norsworthy teaches a digital signal transceiver (see figure 1, col.4, ln.21) comprising:

a transmitter configured to receive a locally generated transmit signal (see figure 1, transmitter 130, col.4, ln.24),

a hybrid electrically coupled to the transmitter (see figure 1, hybrid 190, col.4, ln.39) configured to receive and inductively couple the transmit signal to a two-wire transmission line, the hybrid further configured to receive a remotely generated receive signal along the two-wire transmission line, and

a receiver configured to process the remotely generated receive signal (see figure 1, receiver 250, col.4, ln.58).

It should be noticed that Norsworthy fails to clearly teach an echo canceller disposed in parallel between the transmitter and the receiver configured to reduce both short-term echo components and long-tail echo components of the locally generated transmit signal wherein the echo canceller calculates coefficient values for less than N taps while emulating a N tap digital filter. However, Amrany teach such features (see figure 3, echo canceller 222, col.6, ln.24-26) for a purpose of reducing the amount of echo generated at the transmit path.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the use of an echo canceller disposed in parallel between the transmitter and the receiver configured to

reduce both short-term echo components and long-tail echo components of the locally generated transmit signal wherein the echo canceller calculates coefficient values for less than N taps while emulating a N tap digital filter, as taught by Amrany, into view of Norsworthy in order to improve an echo signal at a transmit path and a receive path in a wire-line local loop communication system.

Regarding claim 18, amrany further teaches the transceiver wherein the echo canceller comprises a bifurcated digital filter that adaptively calculates and applies tap coefficients to each of a plurality of filter taps in a first stage and adaptively calculates and applies a subset of tap coefficient values to a plurality of filter taps in a second stage (col.9, ln.14-20).

Regarding claim 19, Norsworthy further teaches the transceiver wherein the digital filter adaptively calculates a tap coefficient value for a first tap of the second stage and every Kth tap thereafter (col.4, ln.5-10).

Regarding claim 20, Norsworthy further teaches the transceiver wherein the digital filter interpolates the calculated tap coefficient values for the second stage to identify coefficient values to apply at taps disposed between taps associated with a calculated tap coefficient (col.4, ln.5-10).

Regarding claim 21, Norsworthy teaches a method for reducing transmit signal echo (see col.1, ln.35) in a digital transceiver (see figure 1, col.4, ln.21) comprising:

mean for bifurcating a digital filter in response to the conversion rate of the filter tap coefficients (see col.4, ln.1-10),

mean for adaptively deriving and applying a filter tap coefficient to each tap of a first stage of the bifurcated digital filter (see col.4, ln.8-10), and

It should be noticed that Norsworthy fails to clearly teach means for adapting a subset of coefficients each associated with a particular filter tap in the second stage of the filter, the subset of coefficients comprising less coefficients than the number of filter taps in the second stage of the filter, and means for interpolating at least one coefficient value intended for application at a filter tap not associated with an adapted coefficient of the second stage of the filter. However, Amrany teaches such features (see col.9, ln.14-20) for a purpose of correcting echo signal.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the use of means for adapting a subset of coefficients each associated with a particular filter tap in the second stage of the filter, the subset of coefficients comprising less coefficients than the number of filter taps in the second stage of the filter, and means for interpolating at least one coefficient value intended for application at a filter tap not associated with an adapted coefficient of the second stage of the filter, as taught by Amrany, into view of Norsworthy in order to improve an echo signal at a transmit path and a receive path in a wire-line local loop communication system.

Regarding claim 22, Amrany further teaches the method wherein the means for bifurcating is responsive to a digital subscriber line data transmission standard (col.2, ln.60-65).

Regarding claim 23, Norsworthy further teaches the method wherein the means for adapting a subset of coefficients determines a filter tap coefficient for a first tap of the second stage of the bifurcated filter and every eh tap thereafter (see col.4, ln.9-10).

Regarding claim 24, Amrany further teaches the method wherein the means for interpolating comprises determining a filter tap coefficient for each filter tap disposed between adapted filter tap coefficients (col.2, ln.60-67).

Regarding claim 25, Amrany further teaches the method wherein the second stage of the filter applies a coefficient value at filter taps disposed between K"' adapted filter taps as a function of the coefficient value associated with an earlier encountered tap (col.2, ln.60-67).

Regarding claim 26, Amrany further teaches the method wherein the second stage of the filter applies the same coefficient value at taps disposed between K`" adapted filter taps as the coefficient value associated with an earlier encountered tap with an adapted coefficient (col.9, ln.14-20).

Conclusion

5. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. In order to expedite the prosecution of this application, the applicants are also requested to consider the following references. Although Yang et al. (U.S. Patent No. 6,426,979), and Agazzi et al. (U.S. Patent No. 6,477,200) are not applied into this Office Action, they are also called to Applicants attention. They may be used in future Office Action(s). These

references are also concerned for supporting the method for reducing the effects of clipping in a DMT transceiver and adaptation control algorithm for echo cancellation.

6. Any inquiry concerning this communication or earlier communications from the examiner should be directed to **Tuan A. Pham** whose telephone number is (703) 305-4987 and E-mail address: **tuan.pham13@USPTO.GOV**.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mr. Curtis Kuntz, can be reached on (703) 305-4708 and **IF PAPER HAS BEEN MISSED FROM THIS OFFICIAL ACTION PACKAGE, PLEASE CALL Customer Service at (703) 306-0377 FOR THE SUBSTITUTIONS OR COPIES.**

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BINH TIEU
PRIMARY EXAMINER

Art Unit 2643

Date: September 26, 2003